Small Farms Research News

USDA, ARS, SPA

Spring 2002 1st Edition

Soil and Soil Fertility

Tentative Agenda Set for Field Day

The Center will be hosting its second field day in as many years on June 1, 2002. The following is a tentative agenda for the field day. Registration will start at 8:30 a.m. A tour of selected research projects will began at 9:30 a.m. Stops to be included on the tour are:
1) Evaluation of recently released Bermudagrass varieties; 2) Germplasm evaluation and development by Booneville Plant Materials Center/NRCS; 3) Fescue Toxicosis Research including the use of new novel endophyte tall fescues; 4) Beef Production Practices.

The luncheon speaker will be Dr. Keith Lusby, Chairperson of the Animal Science Department, University of Arkansas at Fayetteville. Dr. Lusby is a regular contributor to the Arkansas Cattleman Association's monthly magazine, and a respected beef researcher. Dr. Lusby has greatly served Arkansas livestock industry in recent years by enhancing the faculty and the activities of the Animal Science Department at the University. Dr. Lusby's talk is entitled "How will we be selling cattle in 5 years?".

Two tours are planned after lunch for those who are interested. Availability of both of these tours will be dependent on favorable weather conditions. Participants will need to provide their own transportation for the afternoon stops. Directions will be provided. One tour will visit the Center's research site on the Boys Scout Reservation near Ione where scientists have been conducting research regarding pine straw production, ice storm damage, and management of the understory after a commercial thinning for pulp wood. The second tour, concurrent with the tour to the Boy Scout site, will feature a trial examining the growth of varieties of Eastern Black Walnuts.

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Soil and Soil Fertility

Because soils are the natural body in which plants grow, they are the starting point for successful agriculture; but soils also filter and store water, and serve as a home to countless living organisms that support and sustain all terrestrial life. Soil structure and quality can be seriously and rapidly degraded by poor management decisions, but soil that is well managed and nourished can continue to provide abundant returns and sustain life. Flourishing civilizations have developed in the presence of good soils, but poor management of the soil resource has also been a major factor in their downfall, as soils that were once highly productive became barren and useless. One of our goals at the Research Center is to develop techniques and management practices that help improve and sustain the quality and productivity of American soils for future generations. This issue of *Small Farms Research News* reports some of the research being conducted to achieve that goal.

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Success is to be measured not so much by the position that one has reached in life as by the obstacles that one has overcome while trying to succeed.

Booker T. Washington

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Incorporating Poultry Litter into Perennial Pasture Soils

INTRODUCTION

A long growing season and adequate rainfall provide an excellent climate for good crop production in Arkansas and throughout the southeastern United States, but most soils in this region (except in the Mississippi River delta) are highly-weathered, acidic Ultisols with shallow topsoil and low cation exchange capacity (CEC). Because such soils are not able to hold significant reserves of plant nutrients, crop production by early settlers depleted most of the natural soil fertility, especially in areas where erosion removed the organic matter and topsoil to expose high-clay acid subsoils. However, these soils can be quite productive when well managed to prevent erosion and replenish nutrients.

In recent years, expansion of the poultry industry has provided the resources to restore depleted southeastern soils to high levels of productivity, especially in hilly or mountainous areas where the soils have historically been lowest in fertility. Poultry production has become the primary source of income for many small family farms throughout this region, and poultry manure is a by-product that contains significant quantities of plant nutrients, organic matter, and liming minerals that neutralize soil acidity. Many of the depleted soils have become highly-productive grasslands as producers plant perennial forages that hold the soil against erosion, and use poultry manure applications to replenish soil nutrients and organic matter.

Poultry manure applications have greatly increased the forage and beef outputs from land that had previously been considered marginal for agricultural production. However, the practice of surface-applying on hay meadows and pastures may be limiting the potential benefits that poultry manure can provide, and in some areas it has raised serious water-quality concerns. For example, surface-applying leaves the manure completely exposed to the atmosphere, so much of the nitrogen (N) is lost through ammonia volatilization before it can enter the soil. Several studies have shown that nutrients and coliforms can also be leached from surface-applied manure by heavy rainfall and transported from the field in surface runoff. Therefore, producers need the option of improved management methods that reduce volatilization and runoff losses from poultry manure while making the valuable nutrients more available to crop plants.

Incorporation into the soil has proven to be an effective technique for reducing volatilization and runoff losses and/or enhancing plant growth from both organic and inorganic fertilizers in some cropping systems. In an on-going study at the DBSFRC, we minimized disturbance of the soil structure, forage crop, and thatch by using a knifing technique to incorporate poultry litter (manure mixed with bedding material) below the surface of established grassland. No previous studies had investigated the effects of using such a technique to move poultry litter from the surface runoff zone into the root zone of established perennial forages. If incorporating poultry litter increases soil N and organic carbon levels, it might increase forage yield and quality by improving fertility, cation exchange capacity, structure, tilth, aeration, and/or water-holding capacity of the soil. At the same time, it may improve water and air quality by decreasing soil, nutrient, coliform and metal losses in runoff, as well as reducing odor and gas (CO_2 and NH_3) emissions to the atmosphere. Our objectives were to determine the effects of poultry litter incorporation on (1) forage yield and quality, (2) water, soil, nutrient, coliform, and metal losses in runoff; and (3) long-term nutrient, pH, CEC, and organic C levels in the soil. This study was only designed to objectively evaluate potential benefits of the method. Much more research will be required for the technique to be mechanized and fully evaluated as a practical management option for producers.

MATERIALS AND METHODS

Field plots for this study were constructed in a pasture with 8-10% slopes on an Enders silt loam (Clayey, mixed, thermic Typic Hapludult) in Logan County, Arkansas. Each plot (6 x 6 ft) was fitted with aluminum borders (extending 2 inches above and 4 inches below the surface) to isolate plot runoff, and a downslope trough with sampling pit for runoff collection. Broiler litter was collected from a commercial poultry house, analyzed, mixed thoroughly, and applied to the plots at 2.5 tons/acre dry weight, using one of three application methods (surface-applied, incorporated, or surface-applied on soil-aeration cuts). For surface applications, the litter was

scattered as uniformly as possible over the plot surface. On some plots, soil-aeration cuts were made at each 8 inches interval of the plot length by using a steel blade to slice the soil surface (across the slope) to a depth of 3 inches. Each cut extended the width of the plot. Poultry litter was incorporated by placing it directly in the aeration cuts. Control plots received no litter applications.

One day after treatment applications, a 2+ inches natural rainstorm produced significant runoff, and a sample of this natural runoff was collected from each plot and analyzed. Four days after treatment applications, simulated rainfall was applied (3 inches/hr) to produce 20 minutes of runoff. For each plot, all of the runoff was collected, measured, mixed thoroughly, and sampled for analysis. Treatments were applied again the following season, but this time no natural rainfall occurred before simulated rainfall was used to generate runoff samples.

Throughout the growing season, measurements of forage yield were taken at 21-day intervals. Forage quality was checked by measuring digestibility and crude protein levels. The long-term effects of poultry litter incorporation, especially on nutrient, pH, CEC, and organic C levels in the soil, will be determined in subsequent years.

RESULTS

In the first season, litter application method caused no significant differences in the rain infiltration rate; but in the second season, plots where litter was incorporated clearly absorbed more water at a faster rate than plots where litter was surface-applied. The reason(s) for this effect have not been confirmed, but litter incorporation may have attracted soil metazoans (earthworms, etc.) or stimulated better root growth and soil structure that eventually resulted in larger pore channels and greater water-holding capacity.

Poultry litter incorporation significantly decreased nutrient and metal losses in runoff from all three rainfall events. Nitrogen, phosphorus, and carbon losses in runoff from litter applications were generally 80-90% less when the litter was incorporated into the soil, and the reductions were often more than 95%. Losses of metals such as copper in runoff were almost completely eliminated by litter incorporation, and erosion of solid litter and soil particles from the field was reduced by more than 70% on average. Coliform bacteria counts also tended to be lower in runoff from incorporated litter than from surface-applied litter, but the differences in bacteria counts were not considered significant.

Poultry litter incorporation tended to increase yield, protein content, and digestibility of the perennial forage crop, although the differences were not always considered significant. The study of total forage yield was limited by drought conditions that prevailed late in the growing seasons of both years the forage was harvested. Forage responded well to litter treatments, and mean yields on litter-treated plots were at least 250% of mean yields on control plots that received no litter, regardless of the year or application method. In both years, mean forage yield was approximately 25% higher on plots where litter was incorporated than on plots where it was surface-applied, but the differences were not always considered significant because of variability. Therefore, the litter incorporation process apparently had no detrimental effects on forage yield, and showed a strong tendency to increase yield, possibly in response to increased retention of litter nutrients in the forage root zone.

There has also been considerable interest in the treatment that used soil aeration in conjunction with surface-applied litter, because it was hoped that this would provide a method of retaining litter nutrients that could easily be adopted by producers and implemented with existing farm equipment. By slicing the soil across the path of water flows, it was thought that this technique might funnel nutrient constituents into the soil and prevent their transport from the field in runoff. Although there were some indications that such an effect may have occurred to a very limited extent in early stages of some runoff events, the overall effects of the aeration treatment were not significant and did not occur consistently. In conclusion, aeration cuts alone apparently lose their effectiveness as a runoff event progresses, while incorporation of litter in soil cuts can provide effective control of most nutrient losses throughout the runoff event.

For more information contact Dan Pote.

View customer service as an attitude, not a department.

Soil Plant Nutrient Levels and Botanical Composition of Grasslands

INTRODUCTION

Soils of the central Appalachian region tend be acidic and infertile, and therefore may not have plant nutrient levels that are adequate for forage legume growth. The objectives of this study were to characterize the plant nutrient levels of soils and botanical composition of producers' hay fields and pastures from the central Appalachian region, and determine if current soil fertility management practices were adequate for forage legumes.

MATERIALS and METHODS

Two sampling areas, designated as the WV and central Appalachian, were defined. The WV sampling area included the eastern two-thirds of WV, Highland, Bath and Allegheny counties of VA, Allegheny and Garrett counties of MD. Sixty-two fields were included in the WV sampling area. The central Appalachian sample area consisted of Appalachian region in NC and TN north of I-40 and east of I-75, in KY east of I-75, in KY and OH south of a line running NE from Lexington, KY to a location on the OH border that transects the Mason-Dixon line, and the portion of western WV excluded from the WV sample area. Forty fields were included in the central Appalachian sampling area. Sites in the WV sampling area were visited between July 13 and August 27, 1997. Sites within the central Appalachian sampling area were visited between August 30 and September 13, 1997.

Botanical composition was determined in a 1 to 2 acre portion of each field. Three to four soil cores (6 inch depth) were gathered at each location in the field where botanical composition was determined. The soil cores from all the sampling areas were pooled into a composite sample for each field. Soil samples were air-dried, ground and analyzed for plant available P, Ca, Mg, and K, and soil pH by routine procedures.

Results

The average soil tests values for pH, Ca, Mg, K and P for the 102 fields are presented in Table 1. Characteristics of plant nutrients of the soils from this survey indicate that most farmers are maintaining the levels of plant nutrients in their soils at levels that are satisfactory for forage production, whether those forages were grasses or legumes.

Table 1. Average plant nutrient levels of soils in surveyed fields.

Soil Property	Average Soil Test value
Soil pH	6.2
Soil Ca	3280 pounds per acre
Soil Mg	340 pounds per acre
Soil K	290 pounds per acre
Soil Plant Available P	110 pounds per acre

Red and white clover, were found to be the dominant forage legumes in the surveyed fields. Red clover was more likely to be found in hay fields than pastures and the opposite was true for white clover. However, red clover was found to be the dominant forage legume in some pastures.

The percentage of the stand as forage legumes was low in many fields. Slightly more than 10% of the fields did not contain any forage legumes. About 50% of the fields contained less than 10% of the stand as forage legumes. Only about 25% of the fields had 20 to 40% of the stand as forage legumes. Although there is some disagreement among researchers on the optimum frequency of forage legume for optimum ruminant production, a fraction of less than 20% would be considered inadequate in most cases.

In certain instances (<10% of the surveyed fields) low percentage of the stand as forage legumes was associated with low soil pH. All fields with soil pH values between 5.0 and 5.5 had no detectable levels of forage legumes. These results suggest that a soil pH of 5.5 is necessary for persistence of forage legumes. However, the low percentage of the stand as forage legumes was not associated with acidic soil conditions or low soil test values for plant nutrients. Therefore, the results of this survey suggest that the low percentage of the stand as forage legumes in most producers' fields was due to management decisions other than those related to soil fertility.

For more information regarding this project, contact David Brauer.

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Some people are like good old watches. They are pure gold, open-faced, always on time, dependable, quite busy, and full of good works.

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Effects of Lime and Ca on Nodulation of Clovers

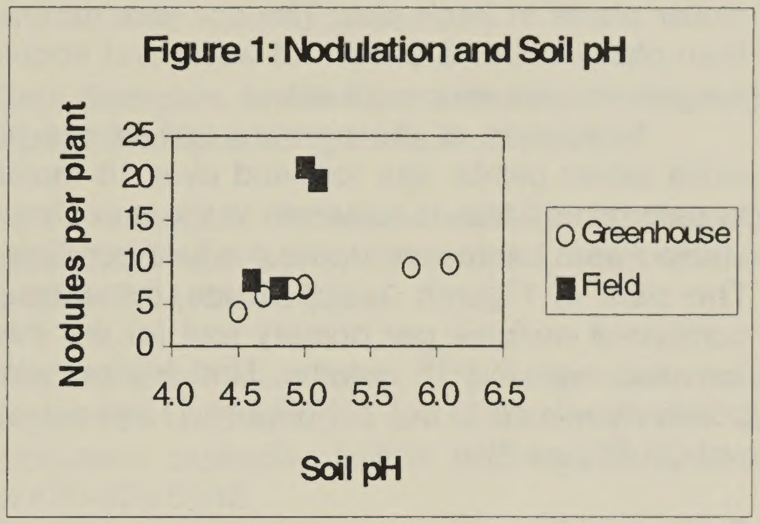
INTRODUCTION

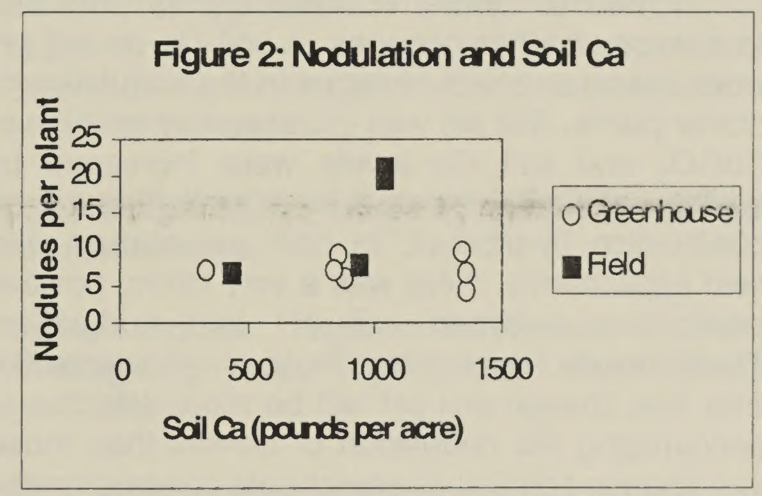
It is well known that addition of lime to soils will increase the nodulation and growth of legumes. It is still not clear whether the effects of liming on nodulation are due to changes in soil pH, soil Al, or soil Ca. In mineral soils, plant available Al is most often controlled by soil pH; however, there is no adequate way of varying soil pH and plant available Al independently with the most mineral soils, like those used in these experiments. Previous studies used soils with a relatively high initial soil pH (6.1 or higher) or added significant amounts of fertilizer N that probably limits the plants' ability to nodulate and fix nitrogen. Understanding whether the benefits of lime on the nodulation of legumes are due to effects on soil pH or Ca is of more concern today than in the past. Coal burning power plants generate an array of Ca by-products, including substantial quantities of $CaSO_4$. Many power-generating companies hope these by-products can be applied to agricultural lands. There are many places in the U.S. including Appalachia and eastern OK where soils are acidic and/or low in Ca, and could benefit from application of Ca by-products generated by local coal burning power plants. The effects of soil Ca and soil pH on legume nodulation need to be fully understood to use these by-products effectively. The objective of this research was to ascribe the effects of lime on nodulation of red and white clover relative to changes in soil Ca or pH.

Greenhouse Experiment.

Top soil (0 to 10 cm) of a Gilpin silt loam (fine loamy, mixed, mesic, Typic Hapludult) was collected from a meadow near New, WV (37°48'40"N by 80°58'30"W, altitude 900 m). The soil from this site had not received fertilizer or lime for the last 40 years. Prior to an experiment, soils were amended with sufficient amounts of $CaCO_3$ or 2 mixtures of $CaSO_4$ and $CaCO_3$ to increase soil Ca by 100 to 700 mg kg^{-1} soil (dry weight) to yield 7 treatments varying in soil Ca and soil pH independently. Soils were allowed to react with amendments for 28 days prior to planting. White clover seeds (variety "Huia") were scarified, germinated for 2 days in sterile distilled water and planted at 0.25 inch depth. Rhizobium inoculum was added the day after planting. Plants (roots and shoots) were harvested from 28 days after planting. Roots were examined visually and the number of nodules $plant^{-1}$ recorded. This experiment was conducted in the greenhouse in August, 1998 and October, 1998.

Soils were amended with $CaCO_3$ or mixtures of $CaCO_3$ and $CaSO_4$ to create a range of soil pH values at different soil Ca levels. There was a strong positive relationship between soil pH and nodules per plant (Figure 1), but not between nodules per plant and soil Ca (Figure 2).





Field Trial

In 1993, an experiment was established in an existing unimproved meadow near New, WV. This field experiment was established within 100 m from where soil was collected for the above experiments. In April, 1994, plots measuring 25 x

10 feet were treated with 4500 pounds dolomitic limestone per acre, 8000 pounds coal combustion by-product gypsum per acre, or both amendments. The coal combustion by-product gypsum contained 10% of Ca as $CaCO_3$ and the remainder as $CaSO_4$. A fourth set of plots received no additional Ca. A sod of tall fescue and orchardgrass was established. Fertilizer was applied from 1993 to 1997 to meet the needs of the forages for these nutrients and to bring soil test levels for P and K to optimum levels. In March, 1998, each plot was split and either red or white clover was drilled into existing sod. On May 15, 1998, August 7, 1998 and May 14, 1999, two soil cores measuring 4 inches in diameter and 4 inches in length were collected from a row of clover plants in each plot. The soil was removed from plants under a stream of water and nodules per primary root were counted.

Nodulation of the primary root of red and white clover plants was followed over 18 months to determine if trends apparent in the greenhouse studies were expressed under the field conditions. The data in Figures 1 and 2 are the average number of nodules per primary root for the three harvests over the 18 months. Nodules per plant positively relates to soil pH (Figure 1) but not with soil Ca (Figure 2).

Summary

The main thrust of these experiments was to assess whether changes in soil Ca or soil pH were associated with changes in the nodulation of clover plants. Soil pH was increased by addition of $CaCO_3$ and soil Ca levels were increased by addition of $CaSO_4$ as a pure chemical or a coal combustion by-product. In both greenhouse and field experiments, there was a very strong positive relationship between soil pH and nodulation. These results suggest that those amendments like lime that change soil pH will be more effective in encouraging the nodulation of clovers than those that change soil Ca, like most coal combustion by-products.

Acknowledgments:
This research was conducted while David Brauer was at the ARS location in Beaver WV. Drs. Ritchey and Belesky of the Beaver location were co-investigators. These results are to be published in Crop Science Journal in the fall of 2002.

For additional information, contact David Brauer.

On-Farm Research to Address the Animal Waste Problem

Scientists at DBSFRC (Glen Aiken, Dave Brauer, and Dan Pote) are collaborating with scientists at the National Soil Erosion Laboratory (West Lafayette, IN) and Soil Dynamics Laboratory (Auburn, AL) to evaluate and compare various approaches to reduce the high P in soils that have been applied with animal wastes over long periods of time. Manure from confined animal facilities have historically been applied to adjacent fields as an organic fertilizer. This has been of benefit to cattle production in the southeast U.S. where manure byproduct from the extensive poultry industry has been effectively and economically utilized to improve forage production in pastures and hay meadows with inherently low soil fertility. A problem with this practice is that phosphorus can accumulate in the soil and reach levels that elevate phosphorus in runoff and contaminate surface streams and waterways.

A project was initiated in 1999 at Feathercrest Farms in Kurten, Texas. Feathercrest Farms manages 500,000 laying birds that produce approximately 400,000 eggs per day. Fifty tons of manure are flushed daily from the ten houses into a primary lagoon. Effluent levels in the lagoon were maintained over a 20 year period by spraying excess effluent on a 200 acre pasture of 'Coastal' bermudagrass. Prior to application of lagoon effluent, a dairy manure waste was applied on the pasture for 25 years. Application of manure on the pasture for close to half a century has raised extractable phosphorus levels in the soil to well over 400 lb/acre. Feathercrest ceased applying lagoon effluent to this pasture and approached USDA-ARS to use this pasture to develop technologies with potential to effectively reduce soil P to environmentally safe levels.

Scientists from the three ARS locations collaborated to initiate an experiment to evaluate soil amendments for their ability to bind and

reduce the solubility of phosphorus. The amendments are alum (aluminum sulfate), gypsum (calcium sulfate), and ground waste paper. Alum is presently being used commercially to treat litter in broiler houses as an effective means of reducing soluble phosphorus in broiler litter. Gypsum, a byproduct of coal combustion, has shown to decrease runoff by improving internal drainage when incorporated in the soil. Waste paper has potential as a soil amendment because it contains high concentrations of alum that is added during the pulping process. Waste paper can also increase the binding ability of the soil through the release of organic matter as waste paper decomposes. Each amendment and combinations of the three amendments were incorporated in plots (25 x 25 ft^2) of bermudagrass in three consecutive years (1999 - 2001). Soils in each plot will be sampled in the spring of 2002, 2003, and 2004 to determine short- and long-term effects of the soil amendments on soil phosphorus.

Another experiment initiated in the summer of 2002 will evaluate the use of forage systems to either reduce phosphorus in high-phosphorus soils or maintain environmentally safe levels of phosphorus in low-phosphorus soils that are being applied with lagoon effluent. The following treatments were assigned to 25 x 25 ft plots: 1) bermudagrass only, 2) bermudagrass overseeded with ryegrass in the fall, 3) bermudagrass overseeded with ryegrass and crimson clover in the fall, and 4) bermudagrass overseeded with annual lespedeza in the spring and ryegrass and crimson clover in the fall. Plots will be harvested in the late spring and through the summer to simulate a hay harvest schedule and determine total hay yield and phosphorus uptake. A full economic analysis will be performed on data to determine the ideal forage system for maximum uptake of phosphorus.

Funding was received from the U.S. Poultry and Egg Association to conduct the soil amendment and forage system experiments. Future studies will delineate nutrient flows through the 200 acre pasture of bermudagrass and evaluate the use of vegetative buffer strips in field perimeters to filter out sediment and phosphorus in runoff water. These experiments will likely evaluate management practices, and identify vegetative components and soil amendments that improve the effectiveness of buffer strips. Results of these experiments should establish recommendations on best management practices to maintain environmentally safe levels of soil P and to restrict the movement of phosphorus from confined animal facilities to streams and waterways.

For additional information, contact Glen Aiken.

Future Newsletter Themes:

Summer 2002- Agroforestry
Fall 2002- Farmer Participatory Research
Winter 2002- Livestock research

Dale Bumpers Small Farms Research Center is a partnership among three institutions:

ARS- conducts research related to livestock production and agroforestry; ARS staff can be reached at 479-675-3834.

PMC/NRCS- evaluation of vegetation and vegetation technology to retain soil and its productive capability; NRCS staff can be reached at 479-675-5182.

Division of Agriculture / University of Arkansas- dissemination of agricultural information. Extension Specialist, Billy Moore, can be reached at 479-675-5585.

ARS scientists at DBSFRC and their primary research focus:

David Brauer- Agronomist/Research Leader investigating both agroforestry and livestock production

Glen Aiken- Agronomist investigating production practices for stockers

Adrian Ares- Forester working on tree growth and physiology in agroforestry systems

David Burner- Agronomist investigating crop production in agroforestry systems

Joan Burke- Animal Scientist investigating reproductive performance in cattle and production practices for hair sheep

Dan Pote- Soil Scientist investigating the effects of management practices on sediment and nutrient retention in agroforestry and livestock production systems.

Organizations promoting agriculture in the Ozark Region

The information below is not an exhaustive list of organizations trying to help farmers and ranchers in the Ozarks. If your organization is interested in being included, please contact David Brauer.

Poultry Production and Product Safety Research Unit (PPPSRU)/ARS/USDA/Center of Excellence for Poultry Science is located on the campus of the University of Arkansas in Fayetteville. PPSRU conducts research to solve problems related to: 1) diseases and physiological disorders that are of economic important to the poultry industry; and 2) land application of waste from the poultry production. PPPSRU can be reached at 479-575-4202 or on the world wide web at www.uark.edu/~usdaars/.

South Central Agricultural Research laboratory (SCARL)/ARS/USDA conducts multi-disciplinary research for developing technologies to establish and sustain production and post harvest quality of alternative crops such as vegetables, small fruits, and kenaf. The Laboratory is co-located with the Oklahoma State University's Wes Watkins Research and Extension Center in Lane, OK. SCARL can be reached by phone at 580-889-7395 or on the world wide web at www.lane-ag.org.

Shirley Community Development Corporation (SCDC) is a community-based organization formed to plan and initiate short- and long-term development programs for Shirley, AR and the surrounding communities. These programs focus on economic development, educational enhancement, youth job training, and service projects that improve and strengthen the community. SCDC is involved in projects that research and demonstrate the skills and techniques needed for production and marketing of specialty agricultural crops. The present focus is on log-grown Shiitake mushrooms. SCDC operates the Shiitake Mushroom Center as a training center. Recent additions include on-site production of garden bricks and stepping stones, raised bed herbal plots, twin wall polycarbonate greenhouse, and compost demonstration project. SCDC can be reached by phone at (501) 723-4443 or on the web at http://www.shiitakecenter.com/index.html.

The Kerr Center for Sustainable Agriculture in Poteau, OK offers leadership and educational programs to those interested in making farming and ranching environmentally friendly, socially equitable, and economically viable. The Kerr Center can be reached by phone at 918-647-9123, by email at mailbox@kerrcenter.com or on the web at www.kerrcenter.com.

ATTRA, Appropriate Technology Transfer for Rural Areas, is the national sustainable agriculture information center. ATTRA provides technical assistance to farmers, Extension agents, market gardeners, agricultural researchers, and other ag professionals. ATTRA is located in Fayetteville, AR. ATTRA staff members prefer to receive requests for information at 800-346-9140. ATTRA maintains a web site at www.attra.org

The Grassroots Grazing Group (GGG) is a network of livestock producers mainly from northwest Arkansas but includes producers from many other states including Virginia, Missouri, and Oklahoma. GGG maintains a electronic mailing list on which members routinely share information and opinions regarding various topics on forage management and livestock production. Members meet monthly, usually at a member's

farm, to see and discuss information related to grazing practices. Individuals interested in joining the GGG should contact Ann Wells at annw@ncatark.uark.edu.

The Center for Advancement of American Black Walnut is a non-profit organization promoting the planting of an improved variety of eastern black walnut for nut production. For more information contact the Center's Director, Jim Jones, at P. O. Box 600, Stockton, MO 65785, 417-276-6010 (voice), 417-276-6011 (fax), or jonesctr@hotmail.com (e-mail).

Information regarding the ***Arkansas Cooperative Extension Service and the Division of Agriculture*** can be found on the internet at the following web site: www.uaex.edu.

Attention

Are you interested in a person to speak at a meeting of your civic or agricultural group? If so, please contact David Brauer at 479-675-3834 to see if we can match your interests/needs to the expertise of the Center's staff.

If you did not receive this newsletter by mail and would like to do so, please contact the Center and we will place you on our mailing list.

Upcoming Events

Field Day	June 1, 2002

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USDA, ARS, SPA, DBSFRC
6883 South State Highway 23
Booneville, AR 72927-9214
Voice: 479-675-3834
FAX: 479-675-2940
E-mail: lalbright@spa.ars.usda.gov